



Title: MultiFlex ETH 1000 Series High-Speed Data Broadcasts
Products(s): All MultiFlex ETH 1000 Series Ethernet motion controllers
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Summary

PMC's MultiFlex ETH 1000 Series Ethernet motion controllers can provide network broadcasts of motor data at very high update rates to support ultra-fast communication of controller and axis data to a user's host application running on a PC. This allows the MultiFlex Ethernet controller to support speed-critical applications where the user has chosen to coordinate and control all motion and I/O events entirely from the host PC.

More Information

The MultiFlex ETH 1000 Series motion controllers communicate with the host computer using standard TCP/IP sockets, allowing the use of common applications such as Telnet, HTTP and FTP. The Motion Control API communicates with the controller over binary and ASCII Telnet sockets, providing a high degree of data integrity through the use of a connection-oriented protocol.

Low-latency access to real time motor data such as position, following error and motor status is crucial to some speed-critical custom applications. For these situations, the controller provides a connectionless protocol which is far more efficient at providing the application with real-time data.

The mechanism for providing the high speed data updates is through the use of an IP broadcast frame that contains a datagram consisting of motor table data for any number of axes that have had the broadcasts enabled. The benefits of using a broadcast frame are

- sparse data frame with no higher protocol encapsulation, reducing network bandwidth
- connectionless protocol, eliminating network acknowledges
- reduction of host computer processing time by elimination of protocol stack processing

The broadcasts are sent from the controller at a rate that is determined by the Broadcast Interval command

BI*n* *n* = interval divisor
Frequency = 1 kHz / *n* (at default motor update rate)

For example, issuing the command BI10 will result in a broadcast frequency of 100 Hz (packet sent every 10 mS).

Note that the IP frame is sent as a unicast Ethernet frame to the default host route which is set at the factory to 192.168.1.1.

Any number of axes can have broadcasts enabled by the use of the MCCL Broadcast Enable command

aBEn a = axis number
 n = 0 (disable broadcasts)
 1 (enable broadcasts)

The table below illustrates the contents of a standard IP broadcast frame including the offsets of the motor data segments contained in the datagram.

byte offset	bit field			
	0-7	8-15	16-23	24-31
0	version/header	diff service	length	
4	id		flags	fragment offset
8	TTL	protocol(0xff)	checksum	
12	source address (192.168.1.100)			
16	destination address (255.255.255.255)			
20	Axis Motor Data packet 0			
52	Axis Motor Data packet 1			
20 + 32n	Axis Motor Data packet n			

The next table shows the specific contents of each motor data packet, beginning with a Start-of-Frame-Delimiter (0xaa) and axis identifier. Currently there are three user-defined data words that can be customized to an individual application as the need arises. If interested, please contact PMC Technical Support for more details.

byte offset	bit field			
	0-7	8-15	16-23	24-31
0	SFD(0xaa)	Axis number	DAC command value	
4	Position Count			
8	Position Error			
12	Motor Status Word			
16	Motor Auxilliary Status Word			
20	User Defined Data 1			
24	User Defined Data 2			
28	User Defined Data 3			